

Accelerator Department
BROOKHAVEN NATIONAL LABORATORY
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AGS DIVISION TECHNICAL NOTE

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INVESTIGATION OF NON-UNIFORM C-RING SEAL COMPRESSION IN
AGS CONVERSION CHAMBERS

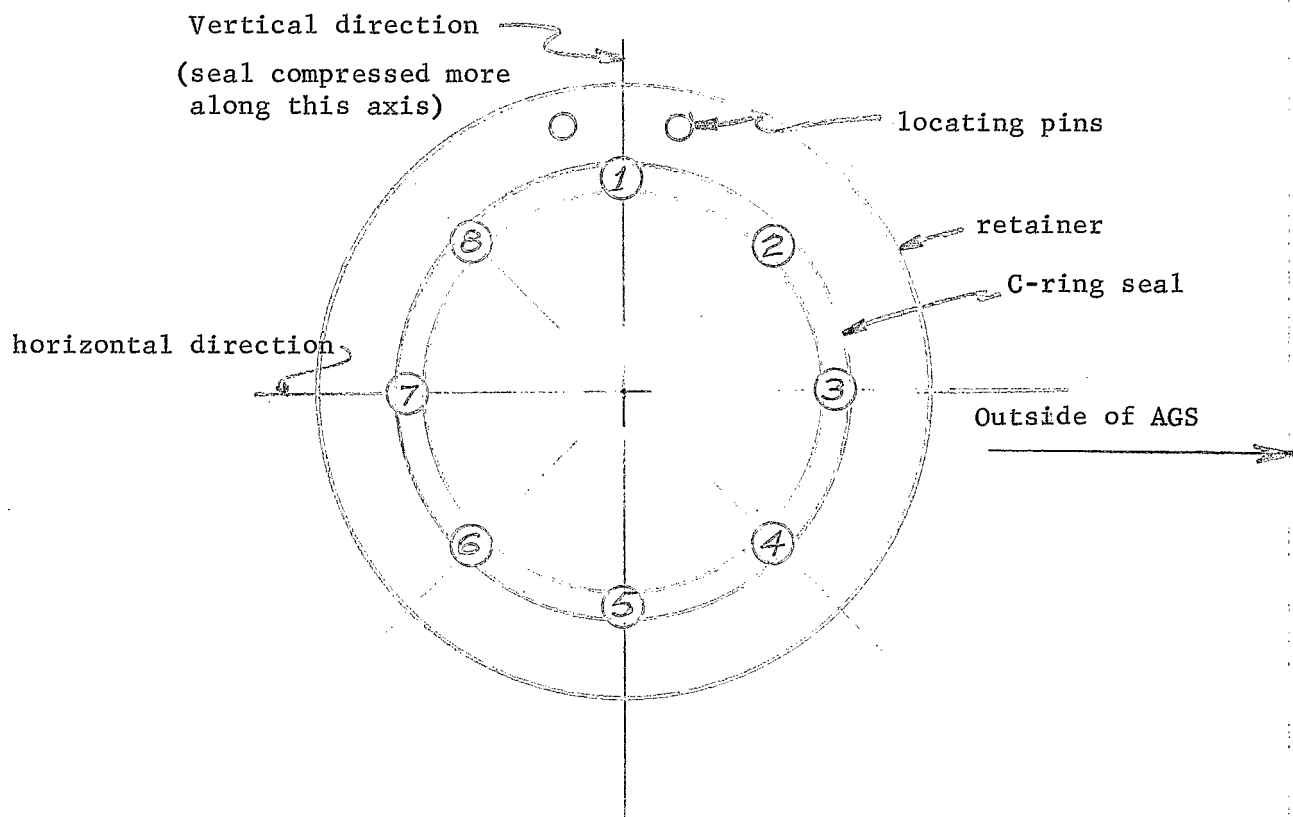
The conversion C-ring seals, which were removed from the "C" super-period because of leaks, were measured for height. All the seals which were used in flanges clamped with Vee-band couplings consistently were compressed more along the vertical axis than along the horizontal, in some case up to .015 inches difference, see Fig. 1. The seals used in bolted joints, i.e., new chamber to old, were uniformly compressed, to about .003 inches.

It is believed that this non-uniformity is directly related to seal leakage. Tests were made on standard conversion chambers which simulated ring conditions. Test results are shown in sketch #2.

Conclusion

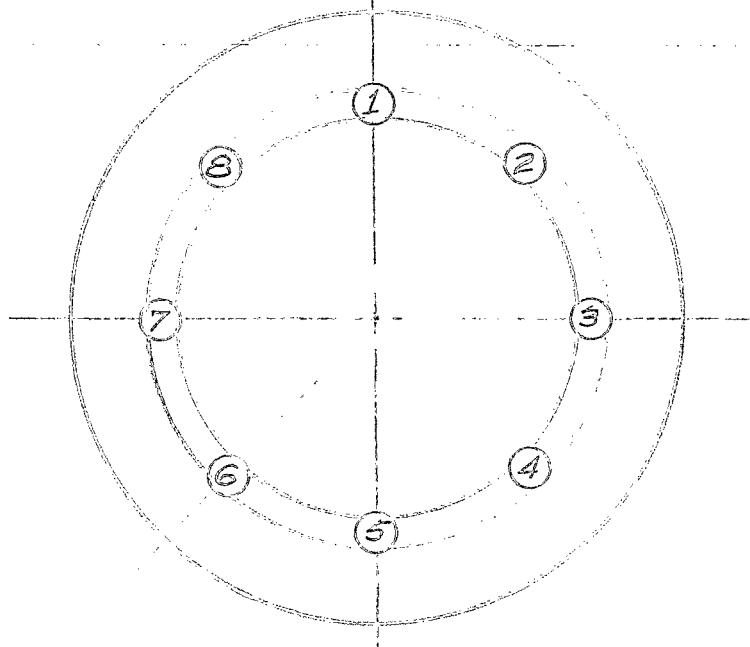
The test results indicate that flange misalignment and clamp tightening procedure are the causes of non-uniform compression of the seal. The problem of flange misalignment is essentially resolved by using the spring-loaded locating plungers on the side of the clamp. Where space prohibits the use of these plungers the outer parts of this assembly can be removed after tightening the clamp.

With regard to tightening the clamp, it is essential that a torque wrench be used and a definite retorquing procedure be followed. The clamp should first be tightened to 250 in-lb, then the clamp should be "seated" by hitting it with a rawhide mallet and retorqued to 250 in-lbs. This procedure should be repeated once more with the chambers under vacuum.



Seal Location	Measuring Points								Max. Diff.
	1	2	3	4	5	6	7	8	
C-9	.175	-	.188	-	.178	-	.190	-	.015
C-8	.170	-	.175	-	.170	-	.169	-	.006
D-4	.176	.179	.187	.184	.179	.180	.188	.178	.012
D-6	.177	-	.182	-	.185	-	.175	-	.010
E-2	.174	-	.188	-	.175	-	.187	-	.014
* D-10	.173	-	.175	-	.174	-	.173	-	.002
*D-10 Bolted flange from rf cavity									

Fig. #1



Max. Diff.	Seal No.	Measuring Points								Conditions
		1	2	3	4	5	6	7	8	
.003	1	.176	.176	.177	.177	.178	.177	.176	.175	Unrestrained chambers
.001	2	-	.176	.177	.177	-	.177	.177	.177	Unrestrained chambers, clamp struck with mallet and retorqued.
.002	3	.178	.178	.180	.178	.179	.180	.180	.180	Restrained chambers.
.002	4	.176	.175	.177	.176	.175	.175	.175	.176	Unrestrained chambers, clamp struck and retorqued.
.007	5	.177	.183	.184	.179	.177	.180	.181	.177	Restrained chambers, clamp struck and retorqued, chambers under vacuum.
.010	6	.180	.188	.190	.183	.180	.181	.186	.182	Restrained chambers, clamp struck and retorqued, flanges offset 5/32 horizontally.
.004	7	.176	.179	.180	.177	.178	.178	.179	.178	Restrained chambers, clamp struck and retorqued, flanges offset, 5/32 under vacuum.
.002	8	.177	.180	.178	.178	.177	.178	.179	.178	Sames as above, but with .005 shims on horizontal axis between flange and clamp
.004	9	.176	.180	.180	.177	.177	.178	.179	.178	Same as above but without shims.
.005	10	.180	.176	.177	.178	.179	.181	.181	.180	Same as seal #8.

Notes 1. Nominal retainer height 0.169

Nominal uncompressed seal height .191

2. At all times clamps were torqued to 250 in-lbs.

3. A properly compressed gasket will spring back about .006 inches after compression.

4. Tests #8 and #10 used brass shims .005 thick x 1" wide between flange and clamp.

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